

# Highlights

Vol. 1: No. 15

Jan. 5, 1959

\* AIRWAYS R&D

\* DEFENSE SCIENCE POLICIES

\* HELIUM RESEARCH

\* JET ENGINE TESTS

\* STANDARD MEASUREMENTS

\* RESEARCH CHECKLIST

## Washington SCIENCE TRENDS

FEDERAL AVIATION AGENCY reports that more than 100 research and development projects are currently underway in connection with the planned modernization of Air Navigation and Air Traffic Control. The projects were among those started by the Airways Modernization Board and transferred to the new Federal Aviation Agency and its Bureau of Research and Development.

"Keystone effort" in the initial phase of the program is a data processing central project. It is designed to provide for the development of a semiautomatic air traffic control data processing and display system to replace the existing manual system in all major high density areas of the nation's airways. Delivery of equipment is expected to begin in May, 1959.

Aviation Agency R&D effort, much of it under contract with private industry, is concerned with the general fields of system research, data acquisition, navigation, communications, data processing and display, airports, and weather.

New Ideas: E.R. Quesada, FAA Administrator, stresses that the Agency is looking for new ideas. He declares: "I welcome any suggestions which you may have, which will assist in attainment of our mutual goal--safe and efficient air navigation and air traffic control."

(Further Information available from Federal Aviation Agency, Bureau of Research and Development, 7th and D Sts. S. W. Washington 25, D. C. A new 124 page R&D Program and Progress Report is available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. for 70 cents.)

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COMMUNICATIONS RESEARCH: Army Ordnance is sponsoring research at the University of Michigan into the possibility of constructing a radio station which would continue to broadcast after losing its electrical power source. The research is now in the stage of pure mathematics. It is believed that if an antenna were broadcasting on exactly the right frequency for its size it would continue to broadcast, or oscillate, after losing its power. The researchers say that the swinging of a pendulum after the force that started it is removed would be a "poor analogy." One possible application is for satellites.

SPACE HANDBOOK: A comprehensive handbook on the applications of Astronautics is being prepared for release by the Rand Corp. and the House Committee on Astronautics and Space Exploration. A limited number of free copies will be available. (Write to the Committee at New House Office Bldg. Washington 25, D. C.)

## DEFENSE SCIENCE-RESEARCH

NEW RESEARCH POLICY: The Department of Defense is spending about \$391 million in the current Fiscal Year for research programs, or about 15 percent of the total Defense research and development budget. Most of this money is spent for work performed by private, academic or non-profit organizations. Now, work is underway to draft a new directive which will establish a uniform policy among all military agencies in the awarding and administration of research grants and the transfer of title to research equipment acquired under such grants.

Increased flexibility in Defense Department support of basic scientific research has been forecast by George D. Lukes, executive secretary of the Defense Science Board. The Department has previously been restricted to the use of contracts in engaging the services of an educational or other non-profit institution. Now, however, Congress has approved the issuance of grants to such institutions, and there is discretionary authority to vest the title of research equipment in the organization carrying out such research.

Here, for reference purposes, is the Defense Department official's summary of research activities supported in the physical sciences:

\* Physics -- the objective is the advancement, through systematic and exploratory research, of those selected aspects of pure and applied physics which contribute to an increase in military capability. The present program, totalling about \$33 million in extramural effort, includes solid-state physics, extreme high-temperature physics, statistical physics, physics of atoms and molecules, nuclear physics, physical acoustics, upper air-physics, electron physics, optics magnetism, instrumentation for physical measurements and electromagnetic radiation.

\* Chemistry -- the objective of the program may be divided into two parts; (1) a balanced effort of selected fundamental research which serves as a foundation for the varying needs of the military and (2) specific applied projects aimed at satisfying short-term defense needs. The present program includes research support in relevant areas of analytical, inorganic, organic, physical, polymer and radiation chemistry. The extramural support runs about \$31 million yearly.

\* Mathematics -- the objective is the systematic advancement of this science, closely geared to the objectives of the other scientific programs, and in response to expanding needs for direct qualitative information about the design and operations of weapons and weapons systems. The present program includes algebra, analysis, geometry, topology, probability, statistics, logistics, communications, and computers. Extramural support runs about \$5 million yearly.

ENGINEERING -- A summary of Defense Department programs in this field will appear in next week's SCIENCE TRENDS.

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Dr. Herbert York faces a formidable task as newly-appointed Director of Defense Research and Engineering. He will serve as the chief adviser to the Secretary of Defense in these fields. Dr. York plans to abolish the Department's Guided Missile Office while absorbing most of its personnel. He plans no major change in the research and engineering activities of the Army, Navy and Air Force but will play a major role in reviewing their budgets and programs. In the opinion of Pentagon officials his major test will be in his relations with the Advanced Research Projects Agency, where he was formerly employed as Chief Scientist.

**HELIUM RESEARCH:** Studies at the Boulder (Colo.) Laboratories of the National Bureau of Standards have demonstrated that it may be feasible to transport helium in a liquid form over great distances. The findings may contribute to a substantial reduction in the cost of helium for rocketry, shielded arc welding, weather balloons, nuclear reactors, aeronautical research and other applications. The study has revealed that large-scale liquefaction plants and liquid distribution systems compare favorably with compressed gas systems as a means of transportation, when quantities and distances are sufficiently great. Transportation costs are currently an appreciable percentage of the total cost of the gas delivered to the consumer.

(Details on methods and equipment available free. Write Office of Technical Information, National Bureau of Standards for Summary Tec. Report No. 2308)

**JET ENGINE TESTS:** Research for the U.S. Air Force is aimed at determining a reliable method for predicting jet engine failures and malfunctions. It is hoped that a simple totalizing recorder-computer can be designed for installation on jet engines to predict expected service life or the need for maintenance. The study could also increase understanding of why design conditions are not always realized in actual operations.

(Details from Batelle Memorial Institute, Division of Aeronautics and Thermodynamics, 505 King Avenue, Columbus 1, Ohio)

**MICROWAVE RESEARCH:** Studies at the Naval Research Laboratory have resulted in development of an "Instantaneous" microwave polarimeter technique. The method is said to have immediate utility in such fields as antennas, propagation, ferrite devices, radar return studies, signal intercept, countermeasures, communications and radar astronomy. The technique uses both phase and amplitude information to provide an accurate, rapid presentation of input signal polarization characteristics with simple and compact microwave plumbing.

(Details from Radar Division, U. S. Naval Research Laboratory, Washington, 25, D. C. Report PB151111 available from OTS, U. S. Department of Commerce, Washington 25, D. C. 11 pages; 50 cents)

**SALINE WATER CONVERSION:** U. S. Department of Interior has signed a \$150,000 contract with Carrier Corp. Syracuse, N. Y. for a pilot plant to convert salt water to fresh water, using a direct freeze process. The newly developed method requires evaporation of a small portion of the sea water in a partial vacuum. This is said to remove sufficient heat at low temperature to cause the remaining water to freeze into a slush. Mixture of pure ice crystals, surrounded by brine is pumped to a flotation separation chamber, where the ice is washed.

(Details from Office of Saline Water, U. S. Department of the Interior, Washington, 25, D. C.)

**STANDARD MEASUREMENTS:** From July 1, 1959 on the U. S. and United Kingdom will adhere to an international yard and pound precisely measured for applications in science and technology. The international yard equals 0.9144 metre and the international pound equals 0.453 592 37 kilogramme. The international inch, derived from the international yard, is exactly equal to 25.4 millimeters. By arrangement, the Coast and Geodetic Survey will use a unit of measurement to be referred to as the American Survey Foot "until such time as it becomes desirable and expedient to readjust the basic geodetic survey networks in the United States."

(Details from Information Office, National Bureau of Standards, Wash. 25, D.C.)



- ( ) Ultrasonic Flaw Detection; a digest prepared to present some of the basic operating theories and procedures used in ultrasonic flaw inspection and in evaluating ultrasonic flaw detection techniques. 34 pages. 30 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication No. C 31.166:3)
- ( ) Dielectric Dispersion; primary dielectric dispersion data and characteristic dispersion parameters are tabulated in this publication for almost 200 substances in the liquid state and for dilute aqueous and nonaqueous solutions. 95 pages. 50 cents. (Write Superintendent of Documents, Government Printing Office, Washington, 25, D. C. for Publication No. C13,4:589)
- ( ) Penetrant Inspection; A digest of fluorescent and dye penetrant inspection, developed as another nondestructive test method to help insure the use of only sound parts in new planes, and to locate damaged parts during the life of the plane. 19 pages. 30 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. No. C31.166:2)
- ( ) Soviet Map Symbols; a Government guide which is designed to provide information required by a map user when reading modern Soviet military topographic maps. 104 pages. \$1. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Publication No. D 101.20:23-5/2)
- ( ) Industrial Hygiene; A syllabus used by the U. S. Public Health Service in training industrial hygiene engineers and chemists. Includes reference materials, lecture outlines and problems, covering the industrial environment, its evaluation and control 395 pages. \$2.75. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. No. FS 2.6 In2)
- ( ) Technical Manpower, a Civil Service Commission guide to more effective recruitment and retention of scientists and engineers through flexibility in the Federal Personnel system. 22 pages. 15 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. No. CS1.54:14)
- ( ) Scientific Documentation; descriptive reports on current research and development in scientific documentation. "Pertinent" U. S. projects as well as a few foreign projects are described. 76 pages. Free. (Write Information Office, National Science Foundation, Washington, 25, D. C.)
- ( ) Language Laboratories, a survey on the use of mechanical and electronic equipment to facilitate language learning in secondary schools and institutions of higher education. 86 pages. 35 cents. (Write Publications Office, U. S. Office of Education, Washington, 25, D. C.)
- ( ) Zirconium and Hafnium; a report on the zircon resources of Florida and other areas in the Coastal Plain states with a discussion of the origin of this metal. 28 pages. 15 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. No. I 19.3:1082-A)

